Study and simulation of the dynamics of competition between Supply Chains on a common market

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The XBeerGame, developed in the CIRRELT at University Laval, Quebec, is an extension of the beer game developed at MIT in the 1960s. Its use was so far limited to a single supply chain on one market and it was impossible to investigate a competition between several supply chains.

The goal of this project is to develop an algorithm of demand distribution that allows simulating several supply chains in competition on a common market. The modeling of the demand distribution between several supply chains is based on an estimation of the behavior expected from a purchaser faced with variable performances of his/her suppliers

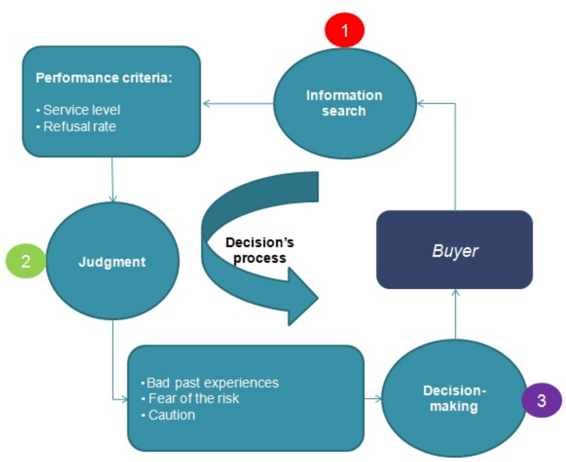
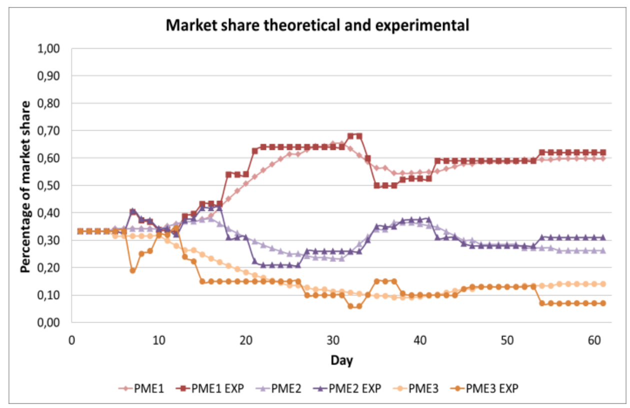


Figure 1: buyer decision's process

This behavior is divided into three main phases: Information search about supplier performances, judgment of the suppliers and final decision-making.

Using the XBeerGame platform, a series of tests are performed with human players to validate the developed algorithm. Each player takes the role of a purchaser faced with fluctuating performances of the suppliers and modifies accordingly their market shares.

Figure 2: Theoretical Market share and experimental



market share

An optimization of the algorithm variables applied to each tests allows achieving satisfactory results with a mean absolute percentage error (MAPE) of about 22% and a mobile MAPE of 17%.

The algorithm seems to model adequately the potential buyer's trends. It opens up promising prospects in modeling competition between supply chains on a common market.